



Fiscal Year 2004  
**Forest Stewardship Program  
Spatial Analysis Project**

Capturing impact, establishing baseline, and focusing future efforts through spatial analysis

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*"We can't know where we're going until we know where we are."*

## Background

Established through the 1990 Farm Bill, the Forest Stewardship Program (FSP) encourages private forest landowners to manage their lands using professionally prepared forest stewardship plans. These plans consider and integrate forest resources, including timber, wildlife and fish, water, aesthetics, and all associated resources to meet landowner objectives. Nationally, the FSP has been successful in meeting the intent of the program; more than 25 million acres of private forests have been placed under professional forestry management.

## Issue

Since its inception, the FSP has been delivered and made available to nonindustrial private forest landowners on a first-come, first-served basis. This customer-friendly approach assists landowners in improving their forest resources; however, it fails to allow assessment of the program's full impact across the landscape. It does not take into consideration the connectivity of stewardship tracts, nor does it target landowners whose forest land has a greater need or opportunity for professional expertise and who may not have been aware of resources and programs available to them. There has been no standard or consistent way to assess the impact that stewardship plans have had on the forest resource as a whole, or in addressing regionally or nationally significant resource issues. Given limited program resources and a demand that exceeds program capacity, FSP coordinators and managers increasingly need to address accountability for results on the ground, assuring the Nation's taxpayers that program implementation is efficient and effective, and positively affects forest resources.

After over a decade of implementation, it is timely to evaluate the impact the Forest Stewardship Program has had on the landscape and position the program to be strategically implemented to more effectively address critical resource management needs in the future, while meeting landowner objectives.

## The Project

**What:** The FSP Spatial Analysis Project (SAP) provides participating States a consistent methodology (while offering them the ability to customize it according to State conditions) to spatially display:

- Important forest lands (rich in natural resources, vulnerable to threat, or both);
- Existing stewardship tracts (properties under stewardship plans); and
- Areas of opportunity to focus future FSP efforts (stewardship potential).

The SAP addresses the following questions, as they relate to the FSP:

1. Where are the State's stewardship tracts?
2. Where are the priority lands (those lands of highest potential to benefit from the FSP)?
3. How do the State's stewardship tracts and priority lands overlap (or not)?
4. Where should greater FSP efforts be considered in the future?
5. What has been the impact of FSP efforts on priority lands and other forest lands?

**Why:** The SAP responds to the issues identified above by:

- Assessing program effectiveness in serving State-identified critical resource management needs;
- Creating geo-referenced, spatial data displaying stewardship tracts relative to FSP potential;
- Relating factors such as stewardship practices completed and resource condition to help determine future practices that might be most effective in addressing critical needs based on the site-specific resource condition; and
- Providing tools that help States focus future FSP efforts to effectively and efficiently address critical forest resource issues.

**Who:** The SAP involves each participating State's geographic information system (GIS) staff and FSP coordinator in cooperation with the State Stewardship Coordinating Committee, and USDA Forest Service (FS) resource and GIS specialists.

**How:** There are three major components to the FSP Spatial Analysis Project:

1. Development of a historic stewardship plan database and associated geo-referenced map of existing stewardship plans in the State, to be maintained on an ongoing basis following initial project completion.
2. Development of a statewide assessment of important forest lands incorporating spatial and tabular display of natural resource data critical to the sustainability of forest resources and the risks or vulnerabilities facing those resources.
3. Analysis of the location of lands currently under stewardship plans and how they relate to the important forest lands in the State, and assessment of how the State intends to use the results of the SAP to guide future FSP activities in conjunction with other assistance programs available to nonindustrial private forest landowners (figure 1).



Figure 1. Overall design of the FSP Spatial Analysis Project, Connecticut

**When (and How Much!):** The SAP is entirely voluntary, driven by both State interest and readiness, and Forest Service and State funding capabilities. As a project within FSP, it is cost-shared with participating States on a 50–50 basis. The total funding amount is to be determined and mutually agreed upon by each State and the Forest Service. On a regular basis (annually or biennially) and as funding permits, FS managers will invite another “tier” of States into the SAP. To date, four States served by the Northeastern Area, State and Private Forestry (Connecticut, Maryland, Massachusetts, and Missouri) have pilot tested the SAP and have preliminary results. Based on these results and intended next steps, the Forest Service is now ready to launch the next tier of States during Fiscal Year 2004.

## Details

**Stewardship Plan Data Layer:** There are two parts to the stewardship plan data layer. Collaboratively, FS database managers and project team members from the four pilot States developed the FS-designed Microsoft Access database structure. This **tabular database** includes stewardship plan date and location, tract size, pertinent resource information (e.g., linear stream length, other resources), pertinent management information (e.g., conservation easement, tax program, tree farm), planned forestry activities and associated practices, and implemented practices and date accomplished. No confidential information is included in this tabular database, although the participating State may choose to link the database to a more detailed database housed entirely and solely by the State.

The **geo-referenced, spatial database** is linked to the tabular database by case number and shows locations of all stewardship tracts in the State. The preferred method is to display stewardship tracts as geo-referenced *polygonal shape files*; however, tract location by center point (centroid) is minimally acceptable. The stewardship plan data layer is prepared at a minimum scale of 1:100,000.

This portion of the SAP project is highly labor intensive, considering that FSP plans developed over the years often exist only as paper copy and must be manually entered into the electronic database, and the tract location scanned and digitized.

**Key Point:** Once a State participates in the SAP, it is imperative to continue to enter new plans into the electronic database, lending to currency and accuracy. The Forest Service is working with the initial pilot States to develop and test a Web-based tool to allow natural resource professionals preparing the plans to enter the information once electronically, including “drawing” the tract location on Web-based available maps. This step is critical to the long-term success and utility of the SAP and will facilitate future FS reporting requirements.

**Statewide Assessment of Important Forest Lands:** The statewide assessment focuses on current conditions to help identify the highest need or opportunity for future Forest Stewardship Program delivery. It is a composite of **common data layers** (table 1) determined by the pilot States and FS specialists to spatially map risks or vulnerabilities to existing forest resources, natural resources important to forest sustainability, current public forest land management, and existing stewardship plans (see discussion on *geo-referenced, spatial database*, page 2). The common data layer selection criteria are as follows:

- The attribute (data layer) represents a strong connection to the potential benefits to be derived from the development and implementation of a forest stewardship plan.
- The data source is existing and readily available at the State, regional, or national level.
- The minimum standard of map scale and resolution is consistent across States.
- The vulnerability or resource potential applies across the States (not solely a single-State concern).

Table 1. SAP Common Data Layers

Data Layer	Source*	Scale
Wildfire assessment	Grid analysis on landcover and DEM	30 meter
Forest patches	MRLC	TM 30 meter
Proximity to public land	CT DEP—public, Federal, and municipal lands	1:24000
Private forested lands	MRLC and DEP	30 meter
Threatened and endangered species	DEP—Heritage database	1:24000
Change in households	USFS, Census block data	30-meter grid
Forest pests	USFS	1:24000
Wetlands	DEP/NRCS or USGS	1:24000
Riparian areas	Derived from DEP hydro streams	1:24000
Public water supplies	DEP—Aquifer protection wells and surface water quality layer	1:24000
Slope	Statewide NED DEM layer, USGS	30 meter
Priority watersheds	HUC from USGS	1:100000
Analysis mask (urban, open water, public lands)	MRLC and DEP data sets	30 meter
Stewardship tracts (polygons)	Digitized or town parcel data	variable
Stewardship tracts (centroids)	Polygon script or address match	variable

\*Source will vary by State. Connecticut sources shown as an example.

In addition to the common data layers, each participating State has the opportunity to add **State-specific layers** that respond to or reflect conditions or resources unique to the State. Other complementing State assessment efforts, State natural resource specialist or State Stewardship Coordinating Committee recommendations, or a combination of these may drive the need for additional data layers. The State is responsible for providing rationale and metadata for these data layers in addition to the metadata for the common data layers.

A **composite map** with associated tabular data of all GIS common data layers, including the stewardship plan data layer, is then developed. States may choose to include the State-specific data layers on this composite map as well. Based on State Stewardship Coordinating Committee or resource specialist recommendations, the data layers may be weighted to indicate priority. The final product is a statewide map that indicates high, medium, and low potential need for development of forest stewardship plans (figure 2).

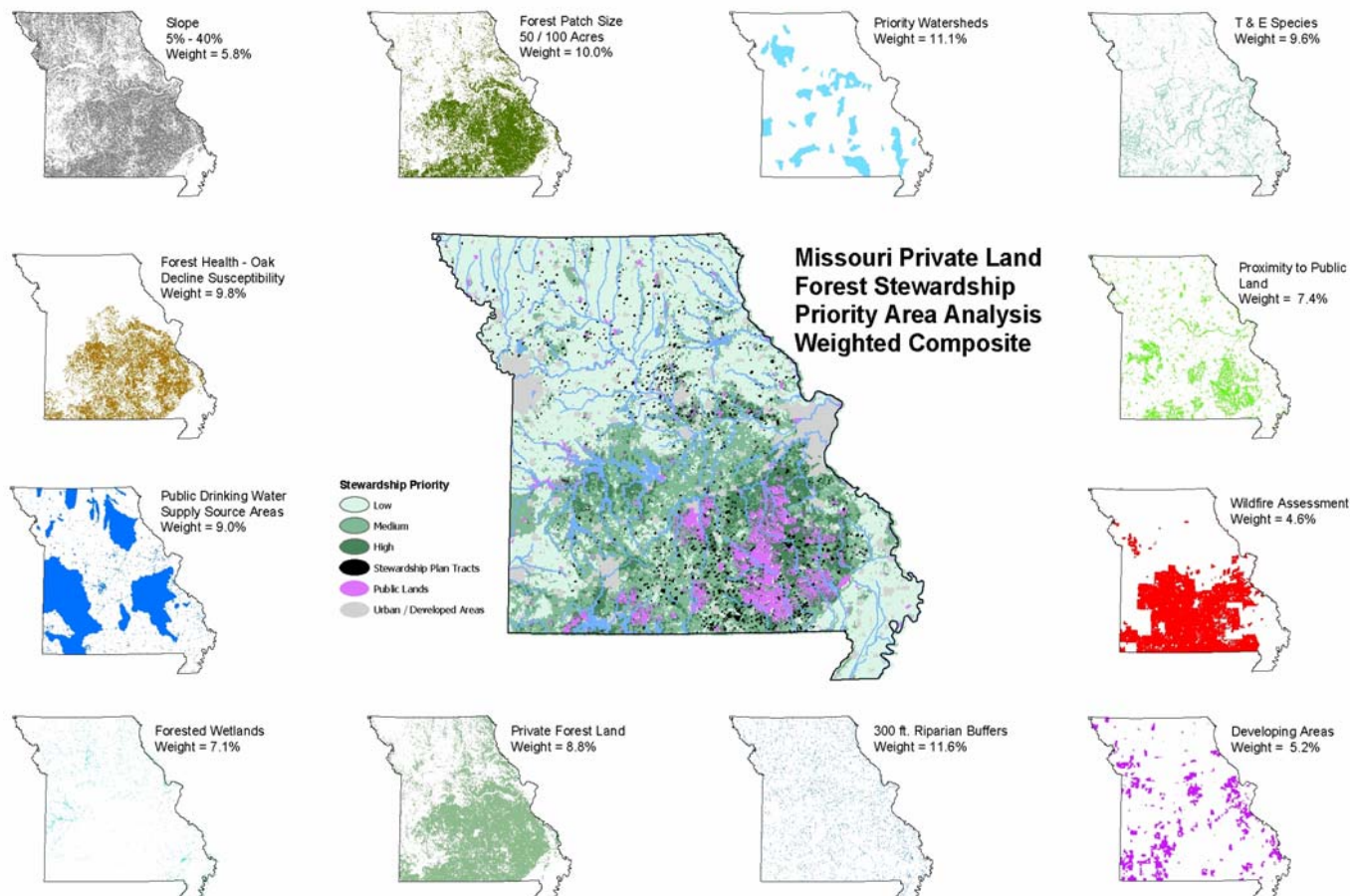


Figure 2. Individual common data layers, contributing to the weighted composite, Missouri

**Analysis:** The tabular data and accompanying composite map contribute to in-depth statewide analyses that consider how stewardship plans correspond to lands identified as having high, medium, or low potential for Forest Stewardship Program benefit. For those working with private landowners on a local level, the results of the analyses can spatially display the potential for stewardship benefit and guide efforts within a given watershed or service forester jurisdictional area. This will aid not only in plan preparation but also in implementation of the activity practices. The analysis and assessment will lead to informed recommendations, considering the resources and vulnerabilities beyond the boundaries of the tract the plan addresses. Based on where the tract is located and surrounding opportunities or challenges, the professional forester may recommend to the landowner that practices be implemented to complement the surrounding land base or to respond to the landscape surrounding the given tract.

## Potential Applications

***Ability to show program effort in working on lands impacted by critical resource management issues in conjunction with other landowner assistance programs, not only to landowners and resource managers, but also to the lawmakers who design the programs, appropriate funds, and to whom we are ultimately accountable.***

Not only can Forest Stewardship Program results be quantified (in the form of number of acres and number of plans) within a State, those results can also be displayed. The Spatial Analysis Project enables resource managers to demonstrate connectivity in program efforts of plan development and how they complement other natural resource efforts and other State and Private Forestry programs. Through time, they will be able to track the accomplishment of plan-prescribed activities on given stewardship tracts.

The results of this project give resource managers the capability to gather and display information according to geographic area, watershed, congressional district, county, or service area (such as district forester jurisdiction) to assess the amount and type of work completed and yet to do.

***Ability to ensure that new stewardship plans consider elements deemed important by the State's Stewardship Coordinating Committee.***

The Forest Stewardship Program emphasizes addressing the landowner's objectives through professional forest management. Often a forest landowner is not aware of the importance of the resources on his or her land, particularly as they relate to surrounding properties. A professional forester has an obligation to help the landowner understand the full potential and extent of the resources on the tract. With that body of information, the landowner then has the capability of making informed decisions about long- and short-term objectives.

The Spatial Analysis Project provides key information concerning not only resource potential and vulnerability, but also the extent of professional management occurring around a given tract, respecting private property rights and confidential information. Landowners may find new opportunities to complement the activities already begun in a geographic area, or learn of a need to protect their tracts from a significant vulnerability such as invasive insects or fire threats.

***Ability to conserve and consolidate forest patch size in critical areas.***

In addressing a plan request backlog or as new opportunities arise to promote the Forest Stewardship Program, service and consultant foresters can build from a core base of forest land. They will be able to identify forest lands of high stewardship potential based either on richness of forest resources or on vulnerabilities, or a combination of the two. They will have enhanced information at their fingertips as they approach and work with forest landowners.

***Ability to more effectively allocate staff resources across the landscape.***

The results of this project can provide information to State forestry agency managers so they can strategically allocate staff resources throughout the State based on the greatest needs and opportunities. In a similar manner, consultant foresters have the ability to look at project results across the State, and target their professional forestry services accordingly. Further, service foresters working within their assigned areas have the ability to determine high, medium, and low needs and opportunities to help prioritize their efforts.

## **Project Responsibilities**

### **The Forest Service will:**

1. Provide funding as mutually agreed upon by both parties, consistent with FSP guidance.
2. Provide a conceptual design of the project (concept paper) and technical oversight and support.
3. Assume responsibility for developing or adapting a consistent data structure to be used by participating States.
4. Concur with State-developed methodology and standards for digitizing stewardship tract locations.
5. Prepare a final report of participating State results, incorporating previous results from pilot States.

### **Participating States will:**

1. Establish methodology identifying stewardship plan tract location for GIS, determining and mapping components of high-risk and suitability for increased stewardship planning emphasis.
2. Collect and enter historic stewardship implementation data into the database (all plans since 1990, or the best of the State's ability). Database elements to include, at a minimum, those core items listed on page 2 (*tabular database*).
3. Create a historic GIS data layer linked to the database with point data or polygonal data files of all current stewardship tracts.
4. Develop a geo-referenced, spatial dataset (ArcView-Arc/Info compatible) of existing plan location and associated attribute information.
5. Develop common data layers in compliance with those listed in table 1 (page 3).
6. Involve the State Stewardship Coordinating Committee at key decision points throughout project development.
7. Determine the need for additional State-specific data layers (either vulnerabilities or natural resources) and develop them accordingly. Consult the State Stewardship Coordinating Committee concerning the additional data layers.
8. Prepare metadata for spatial data in conformance with minimum Federal metadata standards.
9. Update the electronic stewardship plan database continually beyond project completion. Submit updates to the Forest Service annually or as prescribed.

### **Participating States and the Forest Service will:**

1. Compare stewardship tract location and implementation data with areas identified as fire and forest health risks, areas subject to rapid land use change, priority watersheds, and other factors related to critical-land identification.
2. Complete comparison of stewardship plans and historical action with strategic direction for future plan development.
3. Complete analysis, addressing key questions identified on page 1 (*The Project*).
4. Complete a final report for each State.